ABSTRACT

An apparatus is disclosed for generating a three-dimensional (3-D) image of a scene illuminated by a pulsed light source (e.g. a laser or light-emitting diode). The apparatus, referred to as a phase-sensitive 3-D imaging camera utilizes a two-dimensional (2-D) array of photodetectors to receive light that is reflected or scattered from the scene and processes an electrical output signal from each photodetector in the 2-D array in parallel using multiple modulators, each having inputs of the photodetector output signal and a reference signal, with the reference signal provided to each modulator having a different phase delay. The output from each modulator is provided to a computational unit which can be used to generate intensity and range information for use in generating a 3-D image of the scene. The 3-D camera is capable of generating a 3-D image using a single pulse of light, or alternately can be used to generate subsequent 3-D images with each additional pulse of light.